

DESCRIPTION

HEAT IMPRINTING MACHINE WITH SEPARATE WORK PIECE SUPPORT

TECHNICAL FIELD

5 This invention relates to a heat imprinting machine having a heated upper platen movable towards and away from a lower platen. More particularly, it relates to a provision of such machine with a work piece mounting board between the two platens for supporting the article to be printed.

10 BACKGROUND OF THE INVENTION

 It is well known to apply indicia and decorative matter onto shirts, towels, hats, visors, and other articles ("work piece"), by use of a heat transfer process. A layer of thermal-set material is applied to one side of a generally planar sheet, termed a "transfer." Typically, the work piece is positioned on the lower platen of a press. The transfer is set down on the work piece with its thermal-set material in contact with the work piece. Then, a heated upper platen is lowered onto the transfer and pressure and heat are applied to the transfer. The combination of heat and pressure causes adhesion of the transfer to the substrate. Known heat transfer machines in the patent literature are disclosed by the following United States Patents: No. 3,119,728, issued January 28, 1964 to Melvin N. Janapol; No. 4,243,470, granted January 6, 1981 to Shigehiko Higashiguchi; No. 4,386,993, granted June 7, 1983, to Mototsugu Matsuo; No. 4,963,208, granted October 16, 1990 to Charles W. Muncy and Peter Stulberger; No. 5,167,750, granted December 1, 1992 to David A. Meyers; and No. 6,151,814, granted November 28, 2000 to Steve M. Raio, John J. Boyer, Jesus Mendoza and Harry Springer, III. A common feature of these machines is that the work piece is supported on the lower platen.

 There is a need for an improved heat transfer press that is easy and quick to operate. It is a primary object of the present invention to fill this need.

BRIEF SUMMARY OF THE INVENTION

According to an aspect of the invention, a heat imprinting machine is provided that comprises a frame including a base, a support post extending upwardly from the base, and a horizontal support arm connected to the post and spaced above the base. A lower platen is connected to the frame below the support arm. An upper platen is connected to the support arm for movement toward and away from the lower platen. A work piece support is provided which comprises a carrier sleeve surrounding the post that is movable up and down the post, a spring below the carrier, between the carrier and a spring support on the frame, and a work piece supporting board that is positioned between the upper and lower platens. The work piece supporting board has an end portion that is connected to the carrier sleeve. The upper platen is movable downwardly against the work piece holder. This causes the work piece holder to move downwardly against the spring and towards the lower platen.

In preferred form, a detachable connection is provided between an end portion of the work piece support and the carrier sleeve. Also in preferred form, the detachable connection comprises both first and second connector components, one on the sleeve and the other on the work piece support. The first connector component comprises a horizontal connector pin and a support below the connector pin. The second component comprises a tongue having an upwardly directed recess and a lower surface. The tongue is insertable between the connector pin and the support surface into a position in which the connector pin is located in the recess and the surface on the bottom of the tongue is on the support surface.

The connector may further include a locator pin on one of said components and a socket in the other said components. The locator pin is received within the socket when the tongue is on the support surface and the connector pin is in the recess.

In the preferred embodiment, the socket tapers inwardly and the locator pin has a substantially complementary taper. The locator pin may have an internally threaded axial opening to receive an externally threaded leveling screw. The socket has a bottom and the leveling screw has a head that makes contact with the bottom of the socket when the locator pin is in the socket.

In preferred form, at least one key slot is formed in one of the connector components and a complementary key is formed on the other connector component. The key in key slotted extend perpendicular to the connector pin and the recess. Preferably, the key slots are formed in the support below the connector pin and the keys are formed in the bottom of the tongue.

Other objects, advantages and features of the invention will become apparent from the description of the best mode set forth below, from the drawings, from the claims and from the principles that are embodied in these specific structures that are illustrated and described.

BRIEF DESCRIPTIONS OF THE SEVERAL VIEWS OF THE DRAWINGS

Like reference numerals are used to designate like parts throughout several views of the drawing, and:

Fig. 1 is a pictorial view taken from above and looking towards the top, the front and one side of a heat transfer press, showing the upper platen spaced above the rest of the components of the press and showing a work piece mounting board between the two platens;

Fig. 2 is a side elevational view of the heat transfer machine of Fig. 1 showing the upper platen in an up position and showing the work piece supporting board substantially centered between the upper and lower platens;

Fig. 3 is an enlarged scale view of one embodiment of the work piece supporting board, showing the board disconnected and spaced from a carrier that mounts the board on a post at one end of the machine that carries a support arm for the upper platen;

Fig. 4 is an enlarged scale fragmentary view of the connector structure that connects the work piece supporting board to its mounting member;

Fig. 5 is a pictorial view of the component shown by Fig. 4, taken from below and looking upwardly towards the rear, the bottom, and one side of the connector structure;

Fig. 6 is an assembled view partially in side elevation and partially in axial section, showing the two components of the connector structure partially engaged;

Fig. 7 is a view like Fig. 3, but showing the work piece supporting board connected to the carrier;

Fig. 8 is an enlarged fragmentary side elevational view of the rear portion of Fig. 2, with some parts shown in section; and

5 Fig. 9 is a view like Fig. 8, but showing the upper platen moved downwardly against the work piece supporting board and the work piece supporting board moved downwardly against the lower platen.

DESCRIPTION OF THE PREFERRED EMBODIMENT

10 Referring to Figs. 1 and 2, the heat imprinting machine comprises a frame 10 including a base 12, a support post 14 and a horizontal support arm 16. The support post 14 extends upwardly from the base 12. The horizontal support arm 16 is connected to the upper end of the support post 14 and is spaced above the base 12. A lower platen 18 is connected to the frame 10 below the support arm 16. An upper
15 platen 20 is connected to the frame below the support arm 16. A swing handle 22 is provided for use in moving the platen 20 up and down. When the handle 22 is up, the upper platen 20 is spaced upwardly above the lower platen 18 (Figs. 1 and 2). When the handle 22 is pulled downwardly (not shown) it causes mechanisms within a housing 24 to move the upper platen 20 downwardly towards the lower platen 18. This
20 particular mechanism is not a part of the present invention and so it will not be described in any particular detail. Various mechanisms for performing this function are described in the prior art patents that are identified above in the Background of the Invention.

 According to an aspect of the invention, a work piece support 26 is provided for
25 insertion between the platens 18, 20. The particular support 26 that is illustrated is for a T-shirt or a sweatshirt. It includes side springs 28, 30. When the T-shirt or sweatshirt is placed on the support 26, the fabric squeezes inwardly on the springs 28, 30, storing energy in the springs 28, 30. This stored energy acts to cause the springs to stretch the fabric and cause the upper side of the shirt that is on top of the support 26 to
30 be taut and flat on the support 26. Of course, the present invention is not limited to this

particular support or even to a support for a shirt. The support may be for many of the items upon which one might want to place indicia or decorating matter.

The work piece support 26, whatever be its character, is preferably detachably connected to a carrier sleeve 32 that is capable of moving up and down on the post 14.

5 As shown by Figs. 8 and 9, the sleeve 32 includes a bushing 34 that surrounds the post 14. A coil spring 36 surrounds the post 14 below the sleeve 32. The spring 36 is positioned axially between the lower end of the sleeve 32 and a frame member 38 that is on the base 12. When the coil spring 36 is relaxed, such as shown in Fig. 8, the sleeve 32 is positioned by the spring 36 to where it will hold the work piece support 26
10 in a position that is vertically between the platens 18, 20 when the upper platen 20 is in a raised position. When the handle 22 is manipulated to move the upper platen 20 downwardly, the upper platen moves until it contacts the work piece support 26. As it moves further downwardly, the upper platen 20 pushes downwardly on the work piece support 26, moving it and the sleeve 32 downwardly, from the position shown by
15 Fig. 8 into the position shown by Fig. 9. In the position shown by Fig. 9, the spring 36 is compressed. The work piece support 26 is in contact with the lower platen 18. The upper platen 20 is in contact with the work piece support 26. When the upper platen 20 is moved back to its raised position, the stored energy in spring 36 acts on the sleeve 32, moving it upwardly from the position shown in Fig. 9 back into the position shown
20 by Fig. 8. As shown by Figs. 2 and 8, a stop 40 is provided on the post 14 above the sleeve 32. The sleeve 32 is moveable upwardly until it contacts the stop 40. (Fig. 2).

The detachable connection of the work piece support 26 to the sleeve 32 will now be described. Referring to Fig. 4, the sleeve 32 is shown to comprise a horizontal connector pin 42 that is above a support surface 44. Pin 42 spans between two
25 sidewalls 46, 48 of a cavity that is formed in the upper portion of a lug 50 that extends radially from the sleeve 32. The pin 42, the support surface 44 and the lug 50 form a first component of a detachable connection. The second component is a bracket 52 that is connected to one end of the work piece support 26. Bracket 52 includes a horizontal tongue 54 having a laterally extending recess 56 and a bottom surface 58.
30 In preferred form, a pair of key slots 60, 62 are formed in the support surface 44. A pair of complimentary keys 64, 66 are formed on the bottom 58 of the tongue 54. The

key slots 60, 62 and the keys 64, 66 extend generally perpendicular to the connector pin 42. Preferably, also, the keys 64, 66 taper as they extend from their inner ends to their outer ends. The key slots 60, 62, have complimentary tapers.

5 In preferred form, a locator pin 68 is positioned below the tongue 54. It also tapers from its inner end to its outer end. Locator pin 68 fits into a tapered locator pin socket 70 formed in the box 50.

10 The work piece support 26 can be easily and quickly attached to the sleeve 32. This is done by the operator moving the support 26 towards the sleeve 32, with the tongue 54 aligned with the recess formed in the upper end of the sleeve 32. The tongue 54 is moved until the keys 64, 66, when they are used, are moved into the key slots 60, 62. The support 26 is then moved further to place the recess 56 under the connector pin 42. As the recess 56 moves into a position below the pin 42, the locator pin 68 moves into the socket 70, as shown in Fig. 6.

15 Preferably the locator pin 68 includes a threaded axial bore 72 in which a leveling screw 74 is received. The leveling screw 74 has external threads that mate with the internal threads of the socket 72. Leveling pin 74 has a head 76 that is positioned to contact a bottom surface 78 that is in the socket 70. The screw 74 is rotatable to move its head 76 in and out from the socket 72. The leveling screw 74 is rotated until when the support 26 is substantially level, the head 76 of the screw 74 is against the surface 78. Also, the tapered outer surface of the locating pin 68 makes a substantially snug engagement with the tapered inner surface of the socket 70.

20 It should be evident, the work piece mount 26 can be easily and quickly connected and disconnected from the sleeve 32. When it is connected, it is properly positioned relative to the sleeve 32 and also relative to the platens 18, 20. The recess acts as a hook and grabs the pin 42. When the upper platen 20 is moved downwardly, it will push downwardly on the work piece support 26, moving it downwardly towards the lower platen 18. The detachable connection is a stable connection and results in downward movement in the sleeve 32, together with the work piece support 26, compressing the spring 36, until the work piece support 26 is on or at least
30 substantially on the lower platen 18.

The work piece and the transfer are not illustrated. However, it can be seen, that the work piece may be placed on the work piece support 26 and the transfer may be placed on the top of the work piece before the platen 20 is moved downwardly. As known by those skilled in the art, the upper platen 20 is heated and it is this heat and the pressure that is applied when the upper platen 20 is down on the work piece that causes the indicia and/or decorative matter to be transferred onto the upper surface of the work piece.

A user of the imprinting machine may prepare several work piece supports 26, each supporting a different work piece. The several supports 26 can be quickly installed, and then quickly removed and replaced by the next work piece support 26.

As shown in Fig. 4, the connector pin 42 may be made removable in order to make it easier to insert the tongue 54 into the cavity. Then the pin 54 can be slide back into place to put it in the tongue recess.

The illustrated embodiment is only an example of the present invention, and, therefore, is non-limited. It is to be understood that many changes in the particular structure, materials and features of the invention may be made without departing from the spirit and scope of the invention. Therefore, it is my intention that my patent rights not be limited by the particular embodiments that are illustrated and described herein, but rather are to be determined by the following claims, interpreted according to accepted doctrines of claim interpretation, including use of the doctrine of equivalents and of reversible parts.